tions due to ocean depths, for example, up to 5,000 meters. The rotary drive shaft **54** from stepper motor **55** is constructed for example from titanium metal.

By way of example the automated water sampling system of FIGS. **1-4** with multiport valve of FIGS. **5-7** is incorporated in a WSS **90** for time series sequential sampling of sea water at ocean depths up to 5,000 meters. The water sampling system **90** is assembled on a mooring frame **92** with upper and lower mooring eyes **94** and **95**. The programmable controller **96** is contained for example in a titanium pressure housing and includes a stepper motor connector **98** for controlling the stepper motor and multiport valve **14**, a pump motor connector **100** for controlling the pump **12**, not visible, and a communication connector **102** where a personal computer can be coupled for programming the programmable controller **96** and for downloading data from a sample collection time series sequence.

The bank **20** of sample water receivers or containers **22** is shown mounted around the multiport valve **14** with the sample water collectors arranged in an outer double circle for convenient coupling between the respective sample water opening ends of the sample water receivers **22** and the ports **16** of the multiport valve **14**. The cleaning liquid container and flushing liquid container are of course also incorporated in the circular configuration of sample water containers.

Prior to deployment of the WSS a schedule of water sampling events is programmed into the programmable controller **96** using, for example, a personal computer. The water sampling events schedule can be entered in several ways. First, the programmable controller **96** can be programmed to specify the time of occurrence of each of the forty-eight or other selected number of water sampling events. Second a start time can be programmed into the controller along with a specified time intervals between sampling events. Third a start time and stop time can be programmed into the controller **96** which will then automatically space the water sampling events between the programmed start and end times.

The water sample containers are loaded on respective holders around the multiport valve with the pistons in position against the water sample opening ends of the respective water sample containers. The water sample containers are backfilled with pumping water to hold the respective pistons in place until a sampling event occurs. On the other hand the cleaning liquid container is loaded with acid cleaning liquid so that the piston rests against the pumping water end of the cleaning liquid container. Similarly the flushing liquid container is filled with distilled water so that the piston also rests against the pumping water opening end of the flushing liquid container. When the WSS **90** is fully prepared it can be deployed and moored in a remote submarine or subaqueous environment in which it is adapted to operate, providing a time series sequence of water samples.

Operation of the WSS **90** is as follows. When the scheduled time for a water sampling event arrives, the programmable controller directs movement of the multiport valve to the acid cleaning liquid port, that is the port **16** coupled to the cleaning liquid container. The pump **12** is actuated to operate in reverse and acid cleaning liquid is forced and injected out the intake line **15**. The multiport valve **14** then moves to the distilled water port, that is the port **16** coupled to the flushing liquid container. The pump **12** continues to operate in reverse and distilled water is pushed out of the intake line **15** flushing the intake line of acid cleaning liquid. The programmable controller then waits for about five minutes so that the acid cleaning liquid and distilled water diffuse into the sea water.

The programmable controller then rotates the multiport valve and couples the intake line to the next available empty water sample receiver or container. The pump **12** is actuated to operate in the forward direction and a water sample fills the water sample container. The multiport valve under direction of the programmable controller then rotates to a position between two of the ports **16** so that all of the ports are sealed from the sea water. In this manner the WSS instrument **90** can be deployed continuously in submarine and subaqueous environments for extended periods for example up to fourteen months.

After retrieving the WSS instrument **90** from a deployed location, water samples are removed from the respective water sample containers by injecting or pumping water against the back side of the piston. Data relevant to the water sampling events is also retrieved from the programmable controller **96** using an external computer and standard communication port such as an RS-232 port. A communications port such as the RS-232 port is also used during programming of the programmable controller **96**.

For a use of plastic bags as sample water receivers or containers, the bag is formed with a single opening which is fitted over a respective port **16** or water sampling inlet coupled to the port. Typically a metalized polyethylene bag such as a space shuttle bag is used for the water sample collecting bag. The bag is typically placed in a tube or cylinder accommodating the bag volume of for example 1 liter. When the bag is empty prior to use and deployment in collecting a water sample, the tube or cylinder is filled with water so that the bag is in a collapsed condition. When a scheduled water sampling event occurs, the pump **12** pumps the pumping water out of the tube which causes the sample collecting bag to expand and fill with the water sample.

The WSS **10**, **90** of the present invention may be used for a variety of automated water sampling sites for example at remote locations. Water samples may be collected for a variety of research, environmental laboratory, and water analysis purposes and studies such a nutrient levels, CO_2 concentrations, dissolved organic matter, trace elements, pollutants, etc. The WSS is applicable for collecting water samples in a variety of marine and limnological environments, oceans, lakes, rivers etc.

While the invention has been described with reference to particular example embodiments it is intended to cover all modifications and equivalents within the scope of the following claims.

We claim:

1. An automated water sampling system for collecting multiple samples of sample water at a remote site comprising:

a multiport valve having a plurality of ports and respective port inlets, a sample water intake line coupled to the respective port inlets, and valve means for individually opening and closing the port inlets;

a plurality of sample receivers coupled to respective ports of the multiport valve;

at least one container of cleaning liquid coupled to a port of the multiport valve;

an output manifold having a plurality of manifold outlets coupled to the respective sample receivers